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TRANSMITTAL OF APPEAL BRIEF (Large Entity)

Docket No.
END920000065US1

In Re Application Of: **Papathomas, Konstantinos**

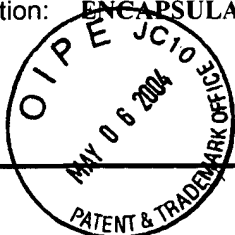
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Examiner
Keehan, Christopher

Group Art Unit
1712

Invention: **ENCAPSULANT COMPOSITION AND ELECTRONIC PACKAGE UTILIZING SAME**



TO THE COMMISSIONER FOR PATENTS:

Transmitted herewith in triplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed on

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Docket No.: END920000065US1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Papathomas, Konstantinos

Examiner: Keehan, Christopher M.

Serial No.: 09/778,996

Art Unit: 1712

Filing Date: 2/7/01

Title: **ENCAPSULANT COMPOSITION AND ELECTRONIC PACKAGE UTILIZING SAME**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

BRIEF OF APPELLANT

This Appeal Brief, pursuant to the Notice of Appeal filed March 15, 2004, is an appeal from the rejection of the Examiner dated December 16, 2003.

REAL PARTY IN INTEREST

International Business Machines, Inc. is the real party in interest.

RELATED APPEALS AND INTERFERENCES

None.

STATUS OF CLAIMS

Claims 1, 5, 6, 8, 14, 18-29, 31, 37, 39, 41, 43, 44, and 46-50 are currently pending.

Claims 1, 5, 6, 8, 14, 18-29, 31, 37, 39, 41, 43, 44, and 46-50 have been rejected. This Brief is

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in support of an appeal from the rejection of claims 1, 5, 6, 8, 14, 18-29, 31, 37, 39, 41, 43, 44, and 46-50.

STATUS OF AMENDMENTS

There are no After-Final Amendments which have not been entered.

SUMMARY OF INVENTION

The present invention discloses an encapsulant composition comprising a resin material selected from the group consisting of epoxy and cyanate ester resins. See specification, page 7, lines 1-2. The composition further comprises a flexibilizing agent comprising 2 percent to about 5 percent by weight of said composition. See specification, page 15 - page 16, line 2. The composition further comprises a filler material comprising substantially spherical or spheroidal particles, each particle having a diameter of less than about 41 microns. Each particle may have a diameter exceeding 31 microns. See specification, page 21, lines 10-12.

A portion of each of said spherical or spheroidal particles may include a layer of coupling agent positioned thereon.. See specification, page 21, lines 16-18.

The epoxy resin may comprise glycidyl ethers. See specification, page 11, lines 22-24.

The cyanate ester resin may comprises at least a di-cyanate ester resin. See specification, page 15, lines 19-24.

The flexibilizing agent may be selected from the group consisting of polysulfones, polyetherimide, polyamideimides, polyarylene ethers, polyesters, polyarylates, polycarbonates, polyurethanes, hydroxy-terminated polysulfone oligomers, 1,4-butane-diol diglycidyl ethers,

neopentylglycol diglycidyl ether, cyclohexane dimethanol diglycidyl ether, trimethylol ethane triglycidyl ethers, dibromoneopentylglycol glycidyl ethers, propoxylated glycerol polyglycidyl ether, polypropylene glycol glycidyl ether, polyglycidyl ether of castor oil, dimer acid diglycidyl esters, resorcinol diglycidyl ether, epoxidized propylene glycol dioleates, epoxy esters, 1,2-tetradecane oxides, internally epoxidized 1,3-butadiene homopolymers, diglycidyl ether, glycidyl glycidate, bis(2,3-epoxy-2-methylpropyl)ether, polyglycidiepoxydes, E-caprolactone triol, copolymers of butadiene and styrene, butyl rubber, neoprene, polysiloxanes, carboxyl terminated poly n-butylacrylates, maleic anhydride terminated rubbers, epoxy functionalized rubbers, fluoridized rubbers, and hydroxylated or carboxylated EPDM rubbers. See specification, page 16, line 28 - page 19, line 7.

The present invention discloses an electronic package comprising: a substrate having an upper surface; a semiconductor chip mounted on a portion of said upper surface of said substrate and electrically coupled to said substrate, said semiconductor chip having a bottom surface and at least one edge surface being substantially perpendicular to said bottom surface. A material is positioned on at least said portion of said upper surface of said substrate and against at least a portion of said at least one edge surface of said semiconductor chip. The material is an encapsulant composition which includes a resin material, a flexibilizing agent and a filler material. See specification, page 4, lines 21-26; specification, page 6, lines 2-6; FIG. 1. The flexibilizing agent may comprise 2 percent to about 5 percent by weight of said composition. See specification, page 15 - page 16, line 2. The filler material may comprise substantially spherical or spheroidal particles, each particle having a diameter of less than about 41 microns.

Each particle may have a diameter exceeding 31 microns. See specification, page 21, lines 10-12.

A portion of each of said spherical or spheroidal particles may include a layer of coupling agent positioned thereon.. See specification, page 21, lines 16-18.

The electronic substrate may comprise an organic material. The organic material may include a resin selected from the group consisting of epoxies, polyimides, cyanates, fluoropolymers, benzocyclobutenes, polyphenylenesulfides, polysulfones, polyetherimides, polyetherketones, polyphenylquinoxalines, polybenzoxalines, polybenzoxazoles, polyphenylbenzobisthiazoles, dicyclopentadienes, and halide free resin. See specification, page 24, lines 1-10.

The substrate may include a reinforcing material. The reinforcing material may be selected from the group consisting of organic woven fibers, organic non-woven fibers, inorganic woven fibers, and inorganic non-woven fibers. See specification, page 24, lines 10-13.

The substrate may comprise a ceramic material. The substrate may includes a layer of glass material therein. See specification, page 25, lines 10-14.

The resin material may be selected from the group consisting of epoxy and cyanate ester resins. The epoxy resin may comprise cycloaliphatic epoxides. The cycloaliphatic epoxides may be derived from unsaturated aromatic hydrocarbon compounds. See specification, page 7, lines 1 - page 8, line 13.

The epoxy resin may comprise glycidyl ethers. See specification, page 11, lines 22-24

The resin material may be a cyanate ester resin and comprises at least a di-cyanate ester resin. See specification, page 15, lines 19-24.

The flexibilizing agent may be selected from the group consisting of polysulfones, polyetherimide, polyamideimides, polyarylene ethers, polyesters, polyarylates, polycarbonates, polyurethanes, hydroxy-terminated polysulfone oligomers, 1,4-butane-diol diglycidyl ethers, neopentylglycol diglycidyl ether, cyclohexane dimethanol diglycidyl ether, trimethylol ethane triglycidyl ethers, dibromoneopentylglycol glycidyl ethers, propoxylated glycerol polyglycidyl ether, polypropylene glycol glycidyl ether, polyglycidyl ether of castor oil, dimer acid diglycidyl esters, resorcinol diglycidyl ether, epoxidized propylene glycol dioleates, epoxy esters, 1,2-tetradecane oxides, internally epoxidized 1,3-butadiene homopolymers, diglycidyl ether, glycidyl glycidate, bis(2,3-epoxy-2-methylpropyl)ether, polyglycoldiepoxides, E-caprolactone triol, copolymers of styrene, butyl rubber, neoprene, polysiloxanes, carboxyl terminated poly n-butylacrylates, maleic anhydride terminated rubbers, epoxy functionalized rubbers, fluoridized rubbers, and hydroxylated or carboxylated EPDM rubbers. See specification, page 16, line 28 - page 19, line 7.

The composition may include a catalyst material selected from the group consisting of imidazoles, tertiary amines, benzyldimethylamine, 1,3-tetramethyl butane diamine, tris (dimethylaminomethyl) phenol, pyridine, triethylendiamine, aluminum chloride, boron trifluoride, ferric chloride, titanium chloride, zinc chloride, sodium acetate, disodium cyanide, sodium cyanate, potassium thiocyanate, sodium bicarbonate, sodium boronate, and cobalt, manganese, iron, zinc, or copper acetylacetonate, octoate, or naphthenates. See specification, page 22, lines 1-17.

The flexibilizer may comprises a thermoplastic material containing a thermoplastic oligomer backbone. See specification, page 17, lines 28-31.

The present invention discloses a method of making an encapsulant composition. The method comprises providing a first quantity of resin material. The method further comprises adding to said first quantity of resin material a second quantity of flexibilizing agent by homogenizing said flexibilizing agent in said first quantity of resin material by reacting said resin material and said flexibilizing agent together at a temperature of greater than about 100 degrees Celsius. See specification, page 25, lines 17-29. The method further comprises adding to said first quantity of resin material a second quantity of flexibilizing agent by adding to said first quantity of resin material a third quantity of filler material comprising substantially spherical or spheroidal particles, each particle having a diameter of less than about 41 microns. Each particle may have a diameter exceeding 31 microns. The method further comprises adding to said first quantity of resin material a second quantity of flexibilizing agent by blending said resin material. blending is performed under vacuum. See specification, page 21, lines 10-12. After said blending said flexibilizing agent may comprise 2 percent to about 5 percent by weight of said composition. See specification, page 15, line 25 - page 16, line 2.

The flexibilizer may comprises a thermoplastic material containing a thermoplastic oligomer backbone. See specification, page 17, lines 28-31.

ISSUES

1. Whether claims 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, and 48-50 are unpatentable under 35 U.S.C. §103(a) over Christie et al. (5,668,059).
2. Whether claims 1, 5, 6, 8, 18-20, 23, 25-29, 31, 39, 41, 44, and 46-50 are unpatentable under

35 U.S.C. §103(a) over Arldt et al. (5,766,670).

3. Whether claims 1, 5, 6, 8, 44, and 48 are unpatentable under 35 U.S.C. §103(a) over Day et al. (6,444,407B1).

GROUPING OF CLAIMS

The claims are grouped as shown in Table 1. Note that groups are defined for each issue, wherein the issues are distinguished by the prior art reference used to reject claims under 35 U.S.C. §103(a). In other words, each issue (i.e., reference used by the Examiner) should be considered independent of the other issues in this appeal.

Table 1

Group	Issue	Claims	Do Claims of Group Stand or Fall Together?
1	1	1, 5, 6, 14, 18-29, 37, 39	Yes
2	1	31	Yes
3	1	41, 43	Yes
4	1	48-50	Yes
5	2	1, 5, 6, 44	Yes
6	2	8	Yes
7	2	18-20, 23, 25-29, 31, 39, 46	Yes
8	2	41, 47	Yes
9	2	48-50	Yes
10	3	1, 5, 6, 8, 44, 48	Yes

The claims of Groups 5-9 do not stand or fall together with the claims of Groups 1-4, because the claims of Groups 5-9 were rejected under 35 U.S.C. §103(a) over Arldt, whereas the claims of Groups 1-4 were rejected under 35 U.S.C. §103(a) over Christie.

The claims of Group 10 do not stand or fall together with the claims of Groups 1-9, because the claims of Group 10 were rejected under 35 U.S.C. §103(a) over Day, whereas the claims of Groups 1-4 were rejected under 35 U.S.C. §103(a) over Christie and the claims of Groups 5-9 were rejected under 35 U.S.C. §103(a) over Arldt.

The claims of Group 2 do not stand or fall together with the claims of Group 1, because the claims of Group 2 relate to the following question/issue not relevant to the claims of Group 1: whether Christie teaches or suggests any of the flexibilizing agents listed in claim 31.

The claims of Group 3 do not stand or fall together with the claims of Groups 1-2, because the claims of Group 3 are drawn to a method, whereas the claims of groups 1-2 are not drawn to a method.

The claims of Group 4 do not stand or fall together with the claims of Groups 1-3, because the claims of Group 4 relate to the following question/issue not relevant to the claims of Groups 1-3: whether Christie teaches or suggests “wherein each [filler] particle has a diameter exceeding 31 microns”.

The claims of Group 6 do not stand or fall together with the claims of Group 5, because the claims of Group 6 relate to the following question/issue not relevant to the claims of Group 5: whether Arldt teaches or suggests any of the flexibilizing agents listed in claim 8.

The claims of Group 7 do not stand or fall together with the claims of Groups 5-6, because the claims of Group 6 are drawn to an electronic package, whereas the claims of groups

5-6 are drawn to a composition.

The claims of Group 8 do not stand or fall together with the claims of Groups 5-7, because the claims of Group 8 are drawn to a method, whereas the claims of groups 5-7 are not drawn to a method.

The claims of Group 9 do not stand or fall together with the claims of Groups 5-8, because the claims of Group 9 relate to the following question/issue not relevant to the claims of Groups 5-9: whether Arldt teaches or suggests “wherein each [filler] particle has a diameter exceeding 31 microns”.

ARGUMENT

Issue 1

CLAIMS 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, AND 48-50 ARE NOT UNPATENTABLE UNDER 35 U.S.C. §103(A) OVER CHRISTIE ET AL. (5,668,059).

The Examiner rejected claims 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, and 48-50 as allegedly being unpatentable under 35 U.S.C. §103(a) over Christie et al. (5,668,059).

Claims 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, and 48-50

Appellant respectfully contends that claims 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, and 48-50 are not unpatentable over Christie, because Christie does not teach or suggest each and every feature of claims 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, and 48-50. For example, Christie does not teach or suggest “a flexibilizing agent comprising 2 percent to about 5 percent by weight of said composition”.

Appellant notes that the Examiner has alleged that Christie teaches that the flexibilizing agent comprises a maximum of about 1.6 percent by weight of said composition, and the Examiner alleges that “two is close enough to the 1.6% bw of Christie to have the same effect on the composition.” In response, Appellant contends that since the claimed 2 percent differs from Christie’s upper limit of 1.6 percent by 25% which is indeed a very large percentage deviation, the preceding argument by the Examiner is based on nothing more than guesswork and speculation, since the Examiner has not provided any support as to why “two is close enough to the 1.6% bw of Christie ...”.

In addition, the Examiner has not supplied any argument as to why a person of ordinary

skill in the art would modify Christie's maximum disclosed 1.6 weight percent of flexibilizing agent. By not providing appropriate argumentation and support, the Examiner has failed to establish a *prima facie* case of obviousness, as explained next.

Established case law requires that the prior art must contain some suggestion or incentive that would have motivated a person of ordinary skill in the art to modify a reference or to combine references. See *Karsten Mfg. Corp. V. Cleveland Gulf Co.*, 242 F.3d 1376, 58 U.S.P.Q.2d 1286, 1293 (Fed. Cir. 2001 ("In holding an invention obvious in view of a combination of references, there must be some suggestion, motivation, or teaching in the prior art that would have led a person of ordinary skill in the art to select the references and combine them in a way that would produce the claimed invention.")). See also *In re Gordon*, 733 F.2d 900, 902, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984 ("The mere fact that the prior art could be so modified would not have made the motivation obvious unless the prior art suggested the desirability of the modification.")). Appellant maintains that the Examiner has not made any showing of where the prior art suggests a suggest a flexibilizing agent comprising 2 percent by weight of the composition. By not citing any suggestion or incentive in the prior art for a flexibilizing agent comprising 2 percent by weight of the composition, the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, and 48-50.

Morover, the prior art reference must teach or suggest all limitations in the claims. See *In re Wilson*, 424 F.2d 1382, 1385, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970) ("All words in a claim must be considered in judging the patentability of the claim against the prior art"). By not citing any reference that teaches or suggests the claim feature of 2 percent by weight of flexibilizer, the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 1, 5, 6,

14, 18-29, 31, 37, 39, 41, 43, and 48-50.

In addition, Appellant will next demonstrate that such a 2.0 weight percent of flexibilizing agent would violate fundamental concepts of Christie's invention as explained next.

On page 3 of a previous office action mailed 11/08/2002, the Examiner presents a calculation showing that the maximum weight percent of the flexibilizing agent in the composition is 1.6%, based on Christie's disclosure that the maximum weight percent of the epoxy binder in the composition is 80% and the maximum weight percent of the flexibilizing agent in the epoxy binder is 2% (i.e., $80\% \times 2\% = 1.6\%$). Therefore, in order for the maximum weight percent of the flexibilizing agent in the composition to be as high as 2%, then either the maximum weight percent of the epoxy binder in the composition must sufficiently exceed 80% or the maximum weight percent of the flexibilizing agent in the epoxy binder must sufficiently exceed 2%, or both. However, the maximum weight percent of the epoxy binder in the composition cannot exceed 80%, because to do so would force the filler weight composition to be less than 20%, and Christie requires the filler to have a minimum weight percent of 20% in the composition (see Christie, col. 10, lines 10-14).

Therefore, in order for the maximum weight percent of the flexibilizing agent in the composition to be as high as 2%, the weight percent of the flexibilizing agent in the epoxy binder would have to be 2.5% (i.e., $80\% \times 2.5\% = 2\%$). However, Christie utilizes the flexibilizing agent in the epoxy binder to impart desirable mechanical properties to the composition such as flexibility and thermal shock resistance, and Christie identifies this utility of the flexibilizing agent with a range of 0.7% to 2% weight percent in the epoxy binder (see Christie, col. 11, lines 14-24). Since Christie specifically discloses that 0.7% to 2% is the

disclosed range of weight percent to achieve the preceding benefit of the flexibilizing agent, a person of ordinary skill in the art would have no reason to modify Christies invention to use 2.5% as the weight percent. Appellant notes that 2.5% is not only outside of the disclosed 0.7% to 2% range, but is 20% higher than the upper end of 2% of the disclosed 0.7% to 2% range, which represents a major percentage deviation from the flexibilizer range disclosed by Christie for the purpose of imparting desirable mechanical properties to the composition.

In addition, Appellant contends that Christie does not teach or suggest “filler material comprising substantially spherical or spheroidal particles”. The Examiner argues: “It is the examiner's position that the particles of Christie et al. are substantially spheroidal or spherical, as applicant has not defined substantially, and therefore the term substantially has been treated on the merits according to the MPEP, section 2173.05(b). Further, they are the same filler as applicant's.”

In response, Appellant contend that Christie does not teach or suggest that the filler material comprises substantially spherical or spheroidal particles, irrespective of the meaning of “substantially”, and the Examiner has not provided a citation in Christie that has any bearing on this issue. The only argument offered by the Examiner is that Christie discloses “the same filler as applicant's.” Such an argument is an argument of inherency, and an argument of inherency cannot be used, as a matter of law, to support a rejection under 35 U.S.C. §103(a). Moreover, Appellant’s specification discloses on page 23, lines 10-12, that “[t]he filler particles **can** have substantially spherical or spheroidal shapes” (emphasis added). Note that the specification says “can” and does not say “does”, which overcomes the Examiner’s argument of inherency even if

an argument of inherency is permitted 35 U.S.C. §103(a). Accordingly, Appellants contend that the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, and 48-50.

Based on the preceding arguments, Appellant respectfully maintains that claims 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, and 48-50 are not unpatentable over Christie, and that claims 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, and 48-50 are in condition for allowance.

Claim 31

Appellant contends that Christie does not disclose any flexibilizing agent listed in claim 31. The Examiner argues: “Regarding claim 31, Christie et al. disclose a flexibilizing agent selected from the group as instantly claimed (col.11, lines 14-33).”

In response, Appellant contends that col.11, lines 14-33 of Christie does not disclose any flexibilizing agent listed in claim 31. Indeed, the Examiner has not specifically identified in col.11, lines 14-33 of Christie any flexibilizing agent listed in claim 31. Accordingly, Appellants contend that the Examiner has failed to establish a *prima facie* case of obviousness in relation to claim 31.

Claims 41 and 43

The Examiner admits: “Regarding claim 41, Christie et al. do not appear to specifically disclose the instantly claimed method steps.” The Examiner argues: “However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have added

the flexibilizer to the resin at an elevated temperature in a separate step because the flexibilizer acts to make the resin composition more resilient, and if not mixed with the resin and melted into the composition, then it does not have the desired flexibilizing effect on the composition.”.

In response, Appellant notes that the Examiner has not provided any prior art reference to support what the Examiner alleges to be obvious to one of ordinary skill in the art at the time the invention was made. In order to prove obvious, the Examiner must find the suggestion of obviousness in the prior art as explained *supra*, which the Examiner has not done. Accordingly, Appellants contend that the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 41 and 43.

Claims 48-50

Appellant respectfully contends that claims 48-50 are not unpatentable over Christie, because Christie does not teach or suggest “wherein each particle has a diameter exceeding 31 microns”. In particular, Christie requires that “[t]he particle size of the filler **must** not be greater than 31 microns ...” (emphasis added). The preceding “**must**” language in Christie has the legal effect of delineating a precise sharply-defined upper limit of 31 microns to the particle size of the filler. Because of said strong language in Christie, Appellant contends that it is not obvious for the particle size of the filler to exceed 31 microns by *any* finite amount, no matter how small. Since claims 48-50 require the particle size of the filler to exceed 31 microns, Appellant respectfully contends that claims 48-50 are not obvious over Christie.

Appellant acknowledges that the Examiner has presented an argument as to why it would allegedly be obvious for the particle size of the filler to exceed the disclosed upper limiting value

of 31 microns in Christie. Appellant notes that the Examiner's argument is based on the idea that a value reasonably close to 31 microns has the same effect on the composition as does a value of exactly 31 microns. However, the Examiner has not taken into account the aforementioned sharply-defined cutoff of 31 microns in the Christie disclosure. Appellant respectfully maintains that a person of ordinary skill in the art would not consider it obvious to go above 31 microns, even by a very small amount, due the fact that Christie clearly teaches that the particle size of the filler **must** not exceed 31 microns. In other words, a filler particle size exceeding 31 microns is greater than the maximum filler particle size of 31 microns that is unconditionally and unambiguously **required** by Christie.

Based on the preceding arguments, Appellant respectfully maintains that claims 48-50 are not unpatentable over Christie, and that claims 48-50 are in condition for allowance.

Issue 2

CLAIMS 1, 5, 6, 8, 18-20, 23, 25-29, 31, 39, 41, 44, AND 46-50 ARE NOT UNPATENTABLE UNDER 35 U.S.C. §103(A) OVER ARLDT ET AL. (5,766,670).

The Examiner rejected claims 1, 5, 6, 8, 18-20, 23, 25-29, 31, 39, 41, 44, and 46-50 as allegedly being unpatentable under 35 U.S.C. §103(a) over Arldt et al. (5,766,670).

Claims 1, 5, 6, 8, 18-20, 23, 25-29, 31, 39, 41, 44, and 46-50

Appellant respectfully contends that claims 1, 5, 6, 8, 18-20, 23, 25-29, 31, 39, 41, 44, and 46-50 are not unpatentable over Arldt, because Arldt does not teach or suggest each and every feature of claims 1, 5, 6, 8, 18-20, 23, 25-29, 31, 39, 41, 44, and 46-50. For example, Arldt does not teach or suggest "a flexibilizing agent comprising 2 percent to about 5 percent by weight

of said composition”.

Arlt's discussion of the flexibilizer is on col. 9, line 53 - col. 10, line 36, and Arlt does not disclose any weight percent range of the flexibilizer in the composition. Therefore, it cannot be obvious to use the claimed range of 2% to about 5%. There is simply no way to get to any numerical range of weight percent range of the flexibilizer in the composition of Arlt. There needs to be some disclosed range as a starting point for analysis, but Arlt is completely silent and provides no such starting point as to weight percent range of the flexibilizer .

The Examiner argues that one would have arrived at the claimed range through routine experimentation and optimization. Appellant respectfully disagrees. Arlt discloses that the flexibilizer is added to impart flexibility and thermal shock resistance to the epoxy composition (see Arlt, col. 9, lines 53-56). However, Arlt doesn't provide the slightest clue as to how one would arrive at a flexibilizer weight percent that optimizes said flexibility and thermal shock resistance.

In fact, Appellant asserts that there is no enablement in Arlt for selecting a flexibilizer weight percent, and a reference that lacks enablement cannot be used as a prior art reference.

In addition, Appellant contends that Arlt does not teach or suggest “filler material comprising substantially spherical or spheroidal particles”. The Examiner alleges that Arlt discloses “a filler (material comprising substantially spheroidal particles, each having a diameter of less than about 41 microns col.3, lines 1-32). It is the examiner's position that the particles of Arlt et al. are substantially spheroidal or spherical, as applicant has not defined substantially, and therefore the term substantially has been treated on the merits according to the MPEP,

section 2173.05(b): Further, they are the same filler as applicant's."

In response, Appellants contends that Arldt does not teach or suggest that the filler material comprises substantially spherical or spheroidal particles, irrespective of the meaning of "substantially", and the Examiner has not provided a citation in Arldt that has any bearing on this issue. The only argument offered by the Examiner is that Arldt discloses "the same filler as applicant's." Such an argument is an argument of inherency, and an argument of inherency cannot be used, as a matter of law, to support a rejection under 35 U.S.C. §103(a). Moreover, Appellant's specification discloses on page 23, lines 10-12, that "[t]he filler particles **can** have substantially spherical or spheroidal shapes" (emphasis added). Note that the specification says "can" and does not say "does", which overcomes the Examiner's argument of inherency even if an argument of inherency is permitted 35 U.S.C. §103(a). Accordingly, Appellants contend that the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 1, 5, 6, 8, 18-20, 23, 25-29, 31, 39, 41, 44, and 46-50.

Based on the preceding arguments, Appellant respectfully maintains that claims 1, 5, 6, 8, 18-20, 23, 25-29, 31, 39, 41, 44, and 46-50 are not unpatentable over Arldt, and that claims 1, 5, 6, 8, 18-20, 23, 25-29, 31, 39, 41, 44, and 46-50 are in condition for allowance.

Claims 8 and 31

Appellant contends that Arldt does not disclose any flexibilizing agent listed in claims 8 and 31. The Examiner argues: "Regarding claim 8, Arldt et al. disclose a flexibilizer as instantly claimed (col.9, line 63-col.10, line 35) ... Regarding claim 31, Arldt et al. disclose the instantly claimed flexibilizer (col.9, line 63-col.10, line 35)."

In response, Appellant contends the col.9, line 63-col.10, line 35 of Arldt does not disclose any flexibilizing agent listed in claims 8 and 31. Indeed, the Examiner has not specifically identified in col.9, line 63-col.10, line 35 of Arldt any flexibilizing agent listed in claims 8 and 31. Accordingly, Appellants contend that the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 8 and 31.

Claim 18-20, 23, 25-29, 31, and 39

Appellant contends that Arldt does not disclose “a semiconductor chip mounted on a portion of said upper surface of said substrate” and “a material positioned on at least said portion of said upper surface of said substrate and against at least a portion of said at least one edge surface of said semiconductor chip”.

The Examiner alleges that the preceding structural features of claims 18-20, 23, 25-29, 31, and 39 are disclosed in FIG. 1 of Arldt. Appellants contend, however, the preceding structural features of claims 18-20, 23, 25-29, 31, and 39 require the semiconductor chip and the material to be positioned on a same surface (i.e., the upper surface) of the substrate. An inspection of FIG. 1 and col. 2, lines 53-58 of Arldt reveals that the chip is attached to the chip carrier 26, whereas the material (i.e., the fill composition 16) fills a though hole 14 of the substrate 12. Therefore, it is clear that FIG. 1 of Arldt does not even come close to disclosing the preceding structural features of claims 18-20, 23, 25-29, 31, and 39. Accordingly, Appellants contend that the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 18-20, 23, 25-29, 31, and 39.

Claim 41

The Examiner admits: “Regarding claim 41, Arldt et al. do not appear to specifically disclose the instantly claimed method steps.” The Examiner argues: “However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have added the flexibilizer to the resin at an elevated temperature in a separate step because the flexibilizer acts to make the resin composition more resilient, and if not mixed with the resin and melted into the composition, then it does not have the desired flexibilizing effect on the composition.”

In response, Appellant notes that the Examiner has not provided any prior art reference to support what the Examiner alleges to be obvious to one of ordinary skill in the art at the time the invention was made. In order to prove obvious, the Examiner must find the suggestion of obviousness in the prior art as explained *supra*, which the Examiner has not done. Accordingly, Appellants contend that the Examiner has failed to establish a *prima facie* case of obviousness in relation to claim 41.

Claims 48-50

Appellant respectfully contends that claims 48-50 are not unpatentable over Arldt, because Arldt does not teach or suggest “wherein **each** particle has a diameter exceeding 31 microns” (emphasis added). In particular, Arldt does not teach anything particle diameter for each particle of the filler. Instead, Arldt teaches only what the **average** particle size is (see Arldt, col. 3, lines 18-23). Appellant maintains that the average particle size says absolutely nothing about what each particles size is. Claims 48-50 claim that **each particle** has a diameter exceeding 31 microns, and average particle size is irrelevant to claims 48-50.

As an added note, Arldt's disclosure is unclear, because Arldt does not even indicate what kind of average he is talking about. There are all kinds of averages: arithmetic average, weighted average, geometric average, etc. There is no way of knowing what kind of average Arldt is disclosing.

Accordingly, Appellants contend that the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 48-50.

Based on the preceding arguments, Appellant respectfully maintains that claims 48-50 are not unpatentable over Arldt, and that claims 48-50 are in condition for allowance.

Issue 3

CLAIMS 1, 5, 6, 8, 44, AND 48 ARE NOT UNPATENTABLE UNDER 35 U.S.C. §103(A) OVER DAY ET AL. (6,444,407B1).

The Examiner rejected claims 1, 5, 6, 8, 44, and 48 as allegedly being unpatentable under 35 U.S.C. §103(a) over Day et al. (6,444,407B1).

Appellant respectfully contends that claims 1, 5, 6, 8, 44, and 48 are not unpatentable over Day, because Day does not teach or suggest each and every feature of claims 1, 5, 6, 14, 18-29, 31, 37, 39, 41, 43, and 48-50. For example, Day does not teach or suggest "filler material comprising substantially spherical or spheroidal particles". The Examiner alleges that Day discloses "a substantially spheroidal or spherical filler (col.6, lines 35-39)". In response, Appellant contends that col.6, lines 35-39 of Day does not disclose "a substantially spheroidal or spherical filler" as alleged by the Examiner. Accordingly, Appellants contend that the Examiner has failed to establish a *prima facie* case of obviousness in relation to claims 1, 5, 6, 8, 44, and 48.

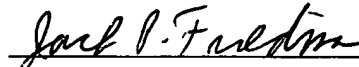
In addition, Applicant contends that Day cannot be used as prior art in rejecting claims of the present patent application, because “[e]ffective November 29, 1999, subject matter which was prior art under former 35 U.S.C. 103 via 35 U.S.C. 102(e) is now disqualified as prior art against the claimed invention if that subject matter and the claimed invention ‘were, at the time the invention was made, owned by the same person or subject to assignment by the same person.’” MPEP 706.02(1)(1). First, the present patent application was filed on February 7, 2001 which is after November 29, 1999. Second, the Day patent is being considered by the Examiner as prior art under former 35 U.S.C. 103 via 35 U.S.C. 102(e), because the Day patent issued on September 3, 2002 which is after the filing date of February 7, 2001 of the present patent application. Third, both the subject matter of Day patent and the claimed invention of the present patent application were, at the time the invention was made, owned by International Business Machines Corporation or subject to assignment by International Business Machines Corporation. Accordingly, Applicant respectfully maintains that Day cannot be used as a prior art reference.

Based on the preceding arguments, Appellant respectfully maintains that claims 1, 5, 6, 8, 44, and 48 are not unpatentable over Day, and that claims 1, 5, 6, 8, 44, and 48 are in condition for allowance.

SUMMARY

In summary, Appellant respectfully requests reversal of the December 16, 2003 Office Action rejection of claims 1, 5, 6, 8, 14, 18-29, 31, 37, 39, 41, 43, 44, and 46-50.

Respectfully submitted,



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellant: Papathomas, Konstantinos

Examiner: Keehan, Christopher M.

Serial No.: 09/778,996

Art Unit: 1712

Filing Date: 2/7/01

Title: **ENCAPSULANT COMPOSITION AND ELECTRONIC PACKAGE UTILIZING SAME**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPENDIX - CLAIMS ON APPEAL

1. An encapsulant composition comprising:

a resin material selected from the group consisting of epoxy and cyanate ester resins;

a flexibilizing agent comprising 2 percent to about 5 percent by weight of said

composition; and

a filler material comprising substantially spherical or spheroidal particles, each particle having a diameter of less than about 41 microns.

5. The composition of claim 1 wherein said resin material is an epoxy resin and comprises glycidyl ethers.

6. The composition of claim 1 wherein said resin material is a cyanate ester resin and comprises

at least a di-cyanate ester resin.

8. The composition of claim 1 wherein said flexibilizing agent is selected from the group consisting of polysulfones, polyetherimide, polyamideimides, polyarylene ethers, polyesters, polyarylates, polycarbonates, polyurethanes, hydroxy-terminated polysulfone oligomers, 1,4-butane-diol diglycidyl ethers, neopentylglycol diglycidyl ether, cyclohexane dimethanol diglycidyl ether, trimethylol ethane triglycidyl ethers, dibromoneopentylglycol glycidyl ethers, propoxylated glycerol polyglycidyl ether, polypropylene glycol glycidyl ether, polyglycidyl ether of castor oil, dimer acid diglycidyl esters, resorcinol diglycidyl ether, epoxidized propylene glycol dioleates, epoxy esters, 1,2-tetradecane oxides, internally epoxidized 1,3-butadiene homopolymers, diglycidyl ether, glycidyl glycidate, bis(2,3-epoxy-2-methylpropyl)ether, polyglycoldiepoxides, E-caprolactone triol, copolymers of butadiene and styrene, butyl rubber, neoprene, polysiloxanes, carboxyl terminated poly n-butylacrylates, maleic anhydride terminated rubbers, epoxy functionalized rubbers, fluoridized rubbers, and hydroxylated or carboxylated EPDM rubbers.

14. The composition of claim 1 wherein a portion of each of said spherical or spheroidal particles includes a layer of coupling agent positioned thereon.

18. An electronic package comprising:

a substrate having an upper surface;

a semiconductor chip mounted on a portion of said upper surface of said substrate and

electrically coupled to said substrate, said semiconductor chip having a bottom surface and at least one edge surface being substantially perpendicular to said bottom surface; and

a material positioned on at least said portion of said upper surface of said substrate and against at least a portion of said at least one edge surface of said semiconductor chip, said material being an encapsulant composition which includes a resin material, a flexibilizing agent comprising 2 percent to about 5 percent by weight of said composition, and a filler material comprising substantially spherical or spheroidal particles, each particle having a diameter of less than about 41 microns.

19. The electronic package of claim 18 wherein said substrate comprises an organic material.

20. The electronic package of claim 19 wherein said organic material includes a resin selected from the group consisting of epoxies, polyimides, cyanates, fluoropolymers, benzocyclobutenes, polyphenylenesulfides, polysulfones, polyetherimides, polyetherketones, polyphenylquinoxalines, polybenzoxalines, polybenzoxazoles, polyphenylbenzobisthiazoles, dicyclopentadienes, and halide free resins .

21. The electronic package of claim 19 wherein said substrate further includes a reinforcing material.

22. The electronic package of claim 21 wherein said reinforcing material is selected from the group consisting of organic woven fibers, organic non-woven fibers, inorganic woven fibers, and

inorganic non-woven fibers.

23. The electronic package of claim 18 wherein said substrate comprises a ceramic material.

24. The electronic package of claim 23 wherein said substrate further includes a layer of glass material therein.

25. The electronic package of claim 18 wherein said resin material is selected from the group consisting of epoxy and cyanate ester resins.

26. The electronic package of claim 25 wherein said resin material is an epoxy resin and comprises cycloaliphatic epoxides.

27. The electronic package of claim 26 wherein said cycloaliphatic epoxides are derived from unsaturated aromatic hydrocarbon compounds.

28. The electronic package of claim 25 wherein said resin material is an epoxy resin and comprises glycidyl ethers.

29. The electronic package of claim 25 wherein said resin material is a cyanate ester resin and comprises at least a di-cyanate ester resin.

31. The electronic package of claim 18 wherein said flexibilizing agent is selected from the group consisting of polysulfones, polyetherimide, polyamideimides, polyarylene ethers, polyesters, polyarylates, polycarbonates, polyurethanes, hydroxy-terminated polysulfone oligomers, 1,4-butane-diol diglycidyl ethers, neopentylglycol diglycidyl ether, cyclohexane dimethanol diglycidyl ether, trimethylol ethane triglycidyl ethers, dibromoneopentylglycol glycidyl ethers, propoxylated glycerol polyglycidyl ether, polypropylene glycol glycidyl ether, polyglycidyl ether of castor oil, dimer acid diglycidyl esters, resorcinol diglycidyl ether, epoxidized propylene glycol dioleates, epoxy esters, 1,2-tetradecane oxides, internally epoxidized 1,3-butadiene homopolymers, diglycidyl ether, glycidyl glycidate, bis(2,3-epoxy-2-methylpropyl)ether, polyglycoldiepoxides, E-caprolactone triol, copolymers of styrene, butyl rubber, neoprene, polysiloxanes, carboxyl terminated poly n-butylacrylates, maleic anhydride terminated rubbers, epoxy functionalized rubbers, fluoridized rubbers, and hydroxylated or carboxylated EPDM rubbers.

37. The electronic package of claim 18 wherein a portion of each of said spherical or spheroidal particles includes a layer of coupling agent positioned thereon.

39. The electronic package of claim 18 wherein said composition further includes a catalyst material selected from the group consisting of imidazoles, tertiary amines, benzyldimethylamine, 1,3-tetramethyl butane diamine, tris (dimethylaminomethyl) phenol, pyridine, triethylendiamine, aluminum chloride, boron trifluoride, ferric chloride, titanium chloride, zinc chloride, sodium acetate, disodium cyanide, sodium cyanate, potassium

thiocyanate, sodium bicarbonate, sodium boronate, and cobalt, manganese, iron, zinc, or copper acetylacetonate, octoate, or naphthenates.

41. A method of making an encapsulant composition, the method comprising the steps of:

providing a first quantity of resin material;

adding to said first quantity of resin material a second quantity of flexibilizing agent by homogenizing said flexibilizing agent in said first quantity of resin material by reacting said resin material and said flexibilizing agent together at a temperature of greater than about 100 degrees Celsius;

adding to said first quantity of resin material a third quantity of filler material comprising substantially spherical or spheroidal particles, each particle having a diameter of less than about 41 microns; and

blending said resin material, wherein after said blending said flexibilizing agent comprises 2 percent to about 5 percent by weight of said composition.

43. The method of making the composition of claim 41 wherein said step of blending is performed under vacuum.

44. The composition of claim 1, wherein said flexibilizer comprises a thermoplastic material containing a thermoplastic oligomer backbone.

46. The electronic package of claim 18 wherein said flexibilizer comprises a thermoplastic material containing a thermoplastic oligomer backbone.

47. The method of claim 41 wherein said flexibilizer comprises a thermoplastic material containing a thermoplastic oligomer backbone.

48. The composition of claim 1 wherein each particle has a diameter exceeding 31 microns.

49. The electronic package of claim 18 wherein each particle has a diameter exceeding 31 microns.

50. The method of claim 41 wherein each particle has a diameter exceeding 31 microns.